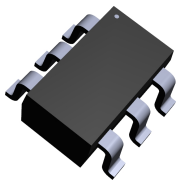
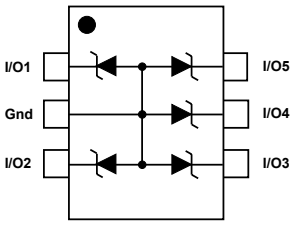
# ESDA6V1-5SC6Y

Datasheet

## Automotive 5 lines TVS for ESD protection



SOT23-6L




| Product status link |
|---|
| ESDA6V1-5SC6Y |

| Product summary | |
|---|---|
| **Order code** | ESDA6V1-5SC6Y |
| **Package** | SOT23-6L |
| **Packing** | Tape and reel |

## Features

- AEC-Q101 qualified
- 5 unidirectional TVS functions
- UL 94, V0
- J-STD-020 MSL level 1
- Benefit:
  - Suitable for high density boards
- Complies with the standard ISO 10605 / IEC 61000-4-2: C = 150 pF, R = 330 Ω
  - ±30 kV (air discharge)
  - ±18 kV (contact discharge)
- Complies with the standard ISO 10605: C = 330 pF, R = 330 Ω
  - ±20 kV (air discharge)
  - ±13 kV (contact discharge)
- Complies with the standard ISO 7637-3
  - Pulse 3a: VS = -150 V
  - Pulse 3b: VS = +100 V

## Applications

Where ESD and EOS transient overvoltage protection in susceptible equipment is required, such as:

- Information - entertainment
- Signal communications
- Connectivity
- Comfort and convenience

## Description

The ESDA6V1-5SC6Y is a monolithic voltage suppressor designed to protect components which are connected to data and transmission lines against ESD.

It clamps the voltage just above the logic level supply for positive transients, and to a diode drop below ground for negative transient.

# 1 Characteristics

**Table 1. Absolute ratings ($T_{amb}$ = 25 °C)**

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{PP}$ | Peak pulse voltage | ISO 10605 / IEC 61000-4-2 (C = 150 pF, R = 330 Ω) | | kV |
| | | Contact discharge | 18 | |
| | | Air discharge | 30 | |
| | | ISO 10605 (C = 330 pF, R = 330 Ω) | | |
| | | Contact discharge | 13 | |
| | | Air discharge | 20 | |
| $P_{PP}$ | Peak pulse power dissipation (8/20 µs), $T_j$ initial = $T_{amb}$ | | 80 | W |
| $I_{PP}$ | Peak pulse current (8/20 µs) | | 7 | A |
| $T_{stg}$ | Storage temperature range | | -65 to +150 | °C |
| $T_j$ | Operating junction temperature range | | -40 to +150 | °C |
| $T_L$ | Maximum temperature for soldering during 10 s | | 260 | °C |

**Figure 1. Electrical characteristics (definitions)**

| Symbol | | Parameter |
|---|---|---|
| $V_{BR}$ | = | Breakdown voltage |
| $I_{RM}$ | = | Leakage current @ $V_{RM}$ |
| $V_{RM}$ | = | Stand-off voltage |
| $V_{CL}$ | = | Clamping voltage |
| $I_{PP}$ | = | Peak pulse current |
| $I_F$ | = | Forward current |
| $V_F$ | = | Forward voltage |
| $R_d$ | = | Dynamic impedance |
| $C_{LINE}$ | = | Line capacitance |

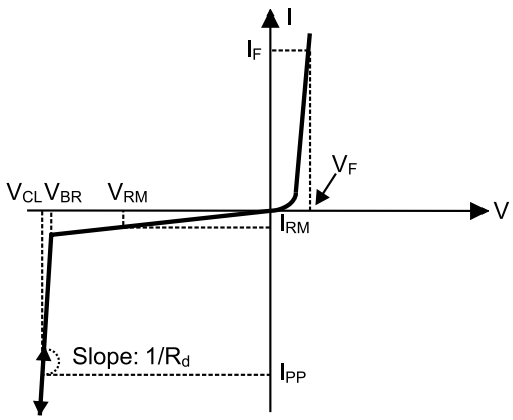
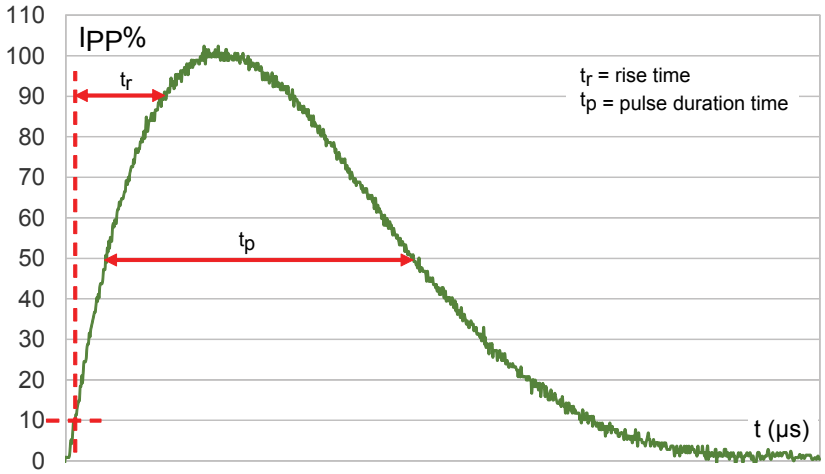



**Table 2. Electrical characteristics - values ($T_{amb}$ = 25 °C)**

| Order code | $V_{BR}$ at $I_R$ | | | $I_{RM}$ at $V_{RM}$ | | $V_{CL}$ at $I_{pp}$ (1) | | $V_F$ at $I_F$ | | αT (2) | $C_{line}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Max. | | Max. | | Max. | | Max. | | Max. | Typ. |
| | V | V | mA | µA | V | V | A | V | mA | $10^{-4}$/C | pF |
| ESDA6V1-5SC6Y | 6.1 | 7.2 | 1 | 1 | 5.2 | 11.4 | 7 | 1.25 | 200 | 6 | 50 |

1. *8/20 µs waveform*
2. *$V_{BR}$ at $T_j$ = $V_{BR}$ at 25 °C x (1 + αT x ($T_j$ - 25 ))*

**Figure 2. Pulse definition for electrical characteristics**



## 1.1 Characteristics (curves)

**Figure 3. Pulse power versus junction temperature**

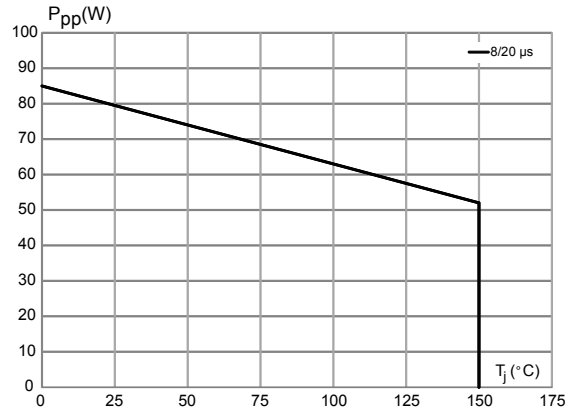



**Figure 4. Peak pulse power versus exponential pulse duration**

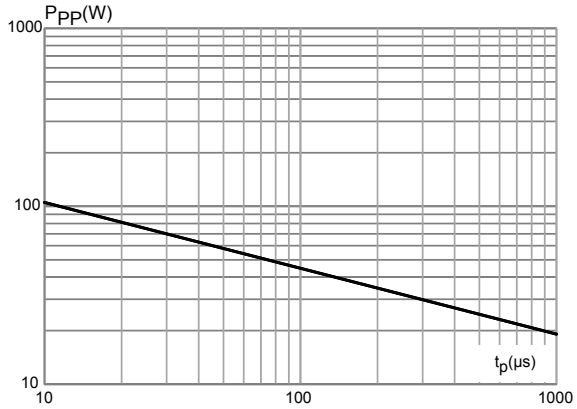



**Figure 5. Clamping voltage versus peak pulse current**

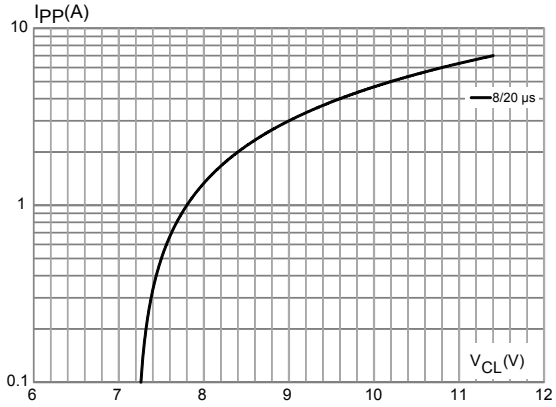



**Figure 6. Leakage current versus junction temperature**

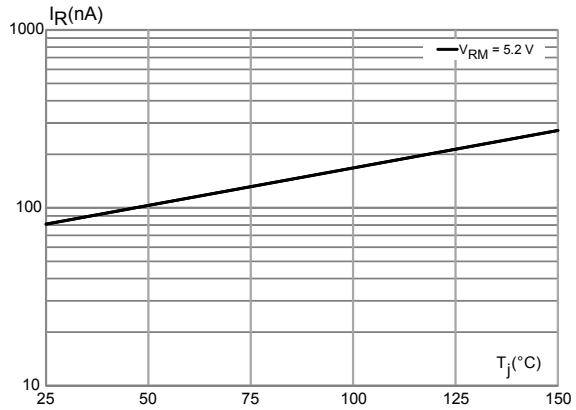


**Figure 7. ESD response to IEC 61000-4-2 (+8 kV contact discharge)**

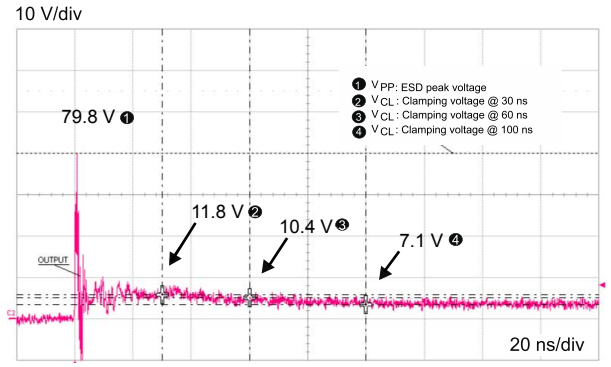



**Figure 8. ESD response to IEC 61000-4-2 (-8 kV contact discharge)**

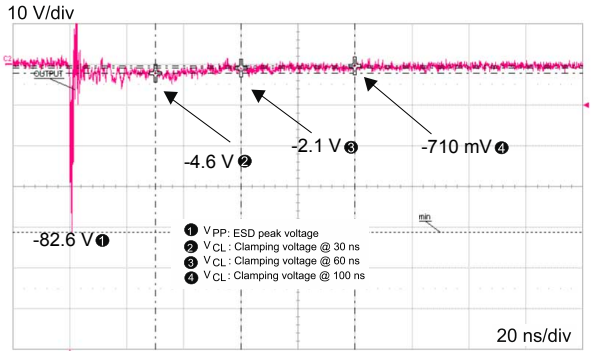



**Figure 9. ISO7637-3 pulse 3a response ($V_S$ = -150 V)**

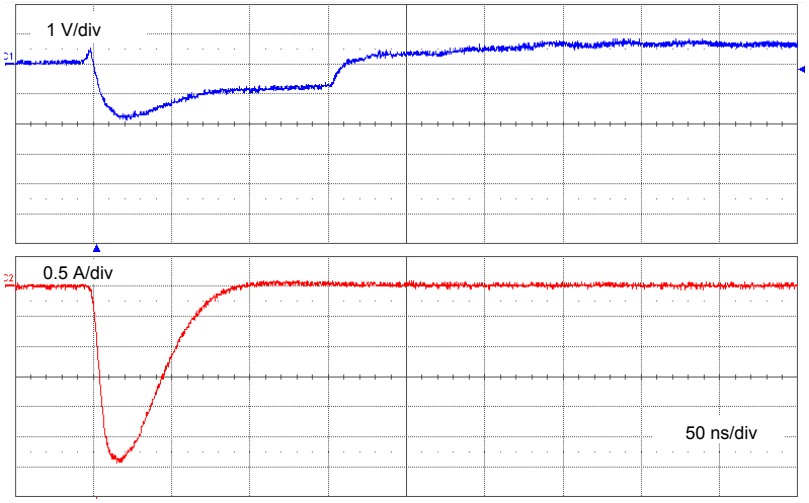
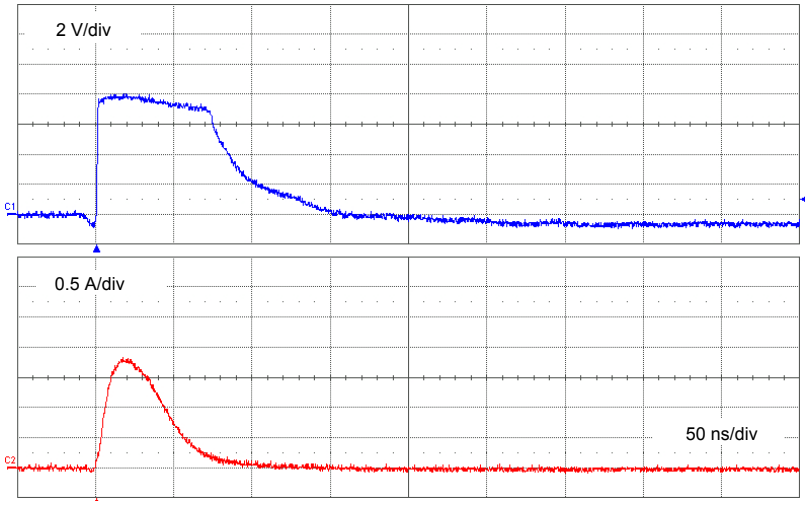



**Figure 10. ISO7637-3 pulse 3b response ($V_S$ = 100 V)**



# 2 Application and design guidelines

Further information can be found in AN2689 titled: “Protection of automotive electronics from electrical hazards, guidelines for design and component selection”.

# 3 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

## 3.1 SOT23-6L package information

- Epoxy meets UL 94,V0
- Lead-free package

**Figure 11. SOT23-6L package outline**

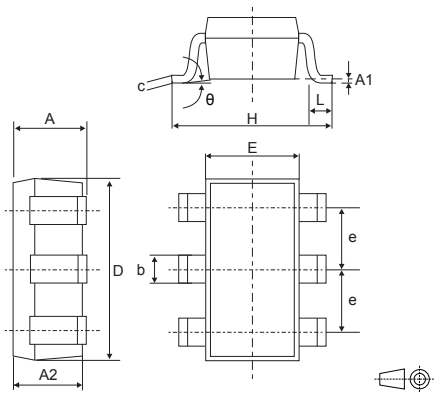



**Table 3. SOT23-6L package mechanical data**

| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 0.9 | | 1.45 | 0.0354 | | 0.0571 |
| A1 | 0 | | 0.15 | 0 | | 0.0059 |
| A2 | 0.9 | | 1.3 | 0.0354 | | 0.0512 |
| b | 0.30 | | 0.5 | 0.0118 | | 0.0197 |
| c | 0.09 | | 0.2 | 0.0035 | | 0.0079 |
| D | 2.8 | | 3.05 | 0.1102 | | 0.1201 |
| E | 1.5 | | 1.75 | 0.0591 | | 0.0689 |
| e | | 0.95 | | | 0.0374 | |
| H | 2.6 | | 3 | 0.1024 | | 0.1181 |
| L | 0.3 | | 0.6 | 0.0118 | | 0.0236 |
| θ | 0 | | 10 | 0 | | 0.3937 |

**Figure 12. Footprint recommendations, dimensions in mm (inches)**

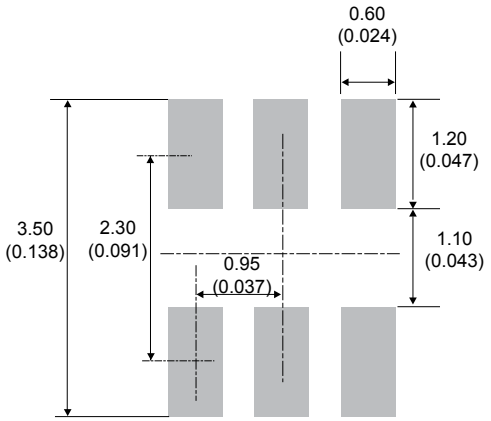



**Figure 13. Marking layout (refer to ordering information table for marking)**

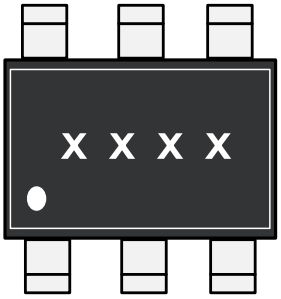
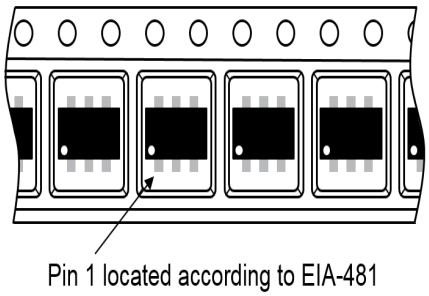



**Figure 14. Package orientation in reel**




Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

**Figure 15. Tape and reel orientation**

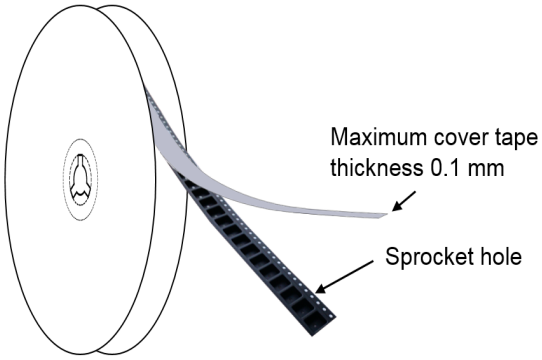



**Figure 16. Reel dimensions (mm)**

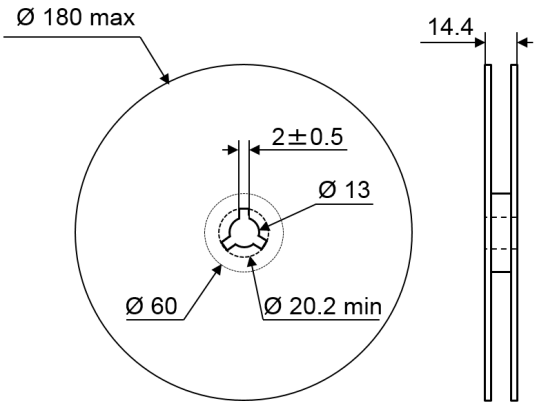



**Figure 17. Inner box dimensions (mm)**

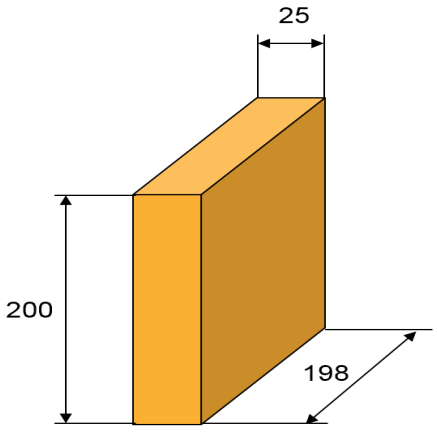
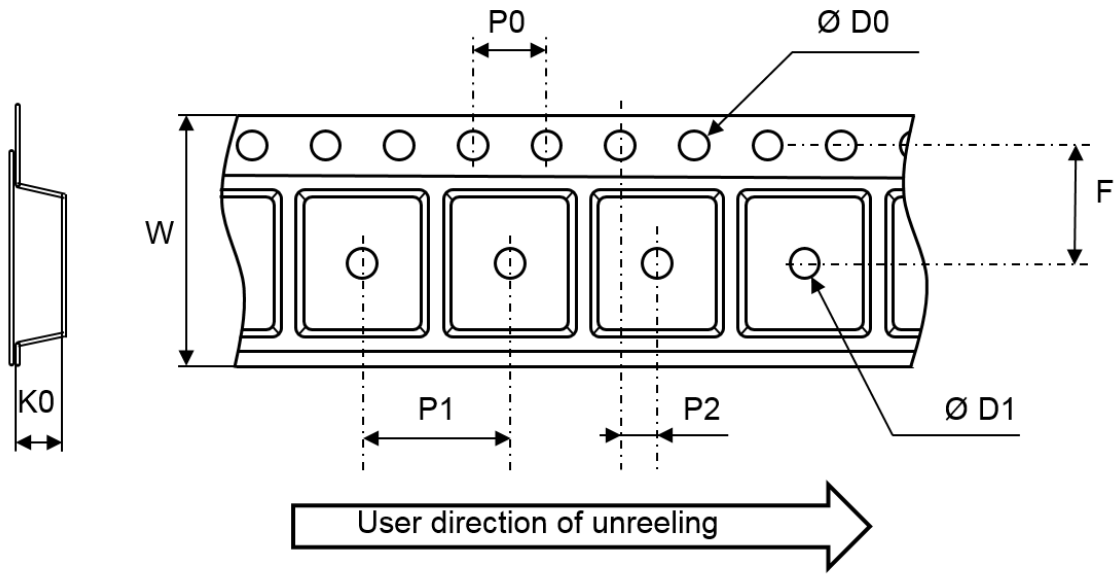


Figure 18. **Tape and reel outline**




Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Table 4. **Tape and reel mechanical data**

| Ref. | Dimensions | | |
|---|---|---|---|
| | Millimeters | | |
| | Min. | Typ. | Max. |
| P1 | 3.9 | 4 | 4.1 |
| P0 | 3.9 | 4 | 4.1 |
| D0 | 1.45 | 1.5 | 1.6 |
| D1 | 1 | | |
| F | 3.45 | 3.5 | 3.55 |
| K0 | 1.3 | 1.4 | 1.6 |
| P2 | 1.95 | 2 | 2.05 |
| W | 7.9 | 8 | 8.3 |

# 4 Ordering information

Figure 19. **Ordering information scheme**

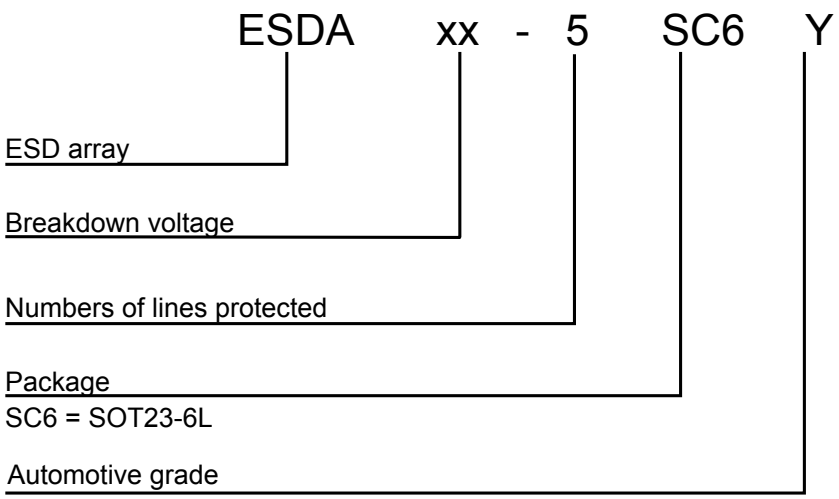



Table 5. **Ordering information**

| Order code | Marking | Package | Weight | Base qty. | Delivery mode |
|---|---|---|---|---|---|
| ESDA6V1-5SC6Y | EC6Y | SOT23-6L | 14 mg | 3000 | Tape and reel |

## Revision history

Table 6. **Document revision history**

| Date | Revision | Changes |
|---|---|---|
| 08-Nov-2016 | 1 | Initial release. |
| 15-Mar-2017 | 2 | Updated title and description in cover page.<br>Minor text changes to improve readability. |
| 03-May-2017 | 3 | Formatting improvement, no content changes. |
| 08-Jan-2019 | 4 | Updated Table 1. |

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